



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,284	07/08/2003	Michael X. Yang	AMAT/7669.P1/CMP/ECP/RKK	9910
44257	7590	09/12/2005	EXAMINER	
MOSER, PATTERSON & SHERIDAN, LLP APPLIED MATERIALS, INC. 3040 POST OAK BOULEVARD, SUITE 1500 HOUSTON, TX 77056			ZHENG, LOIS L	
			ART UNIT	PAPER NUMBER
			1742	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/616,284

Applicant(s)

YANG ET AL.

Examiner

Lois Zheng

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2003.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-32 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7 February 2005.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Status of Claims***

1. Claims 1-32 are currently under examination.

### ***Priority***

2. Claims 1-12, 25 and 28-32 recite a stacked substrate annealing station. Claims 13-25 recite a multi-chemistry fluid delivery system. Claims 26-27 recite means for mixing multiple plating chemistries. The claimed features above are not supported by parent application 10/268,284 that claims benefit of provisional application 60/398,345 filed on 24 July 2002. Therefore, priorities of instant claims 1-32 do not benefit from provisional application 60/398,345.

### ***Means-Plus-Function Language***

3. Instant claims 26-28 contain the flowing terms written in means-plus-function format, and have been interpreted as follows:

“means for mixing multiple plating chemistries in communication with the mainframe” (claim 26) is in proper means-plus-function format and is defined in the specification at page 47, paragraph 107 and in Fig. 18.

“means for delivering multiple chemical solution to each of the plurality of electrochemical plating cells” (claim 26) is in proper means-plus-function format and is defined in the specification at page 47, paragraph 107 and in Fig. 18.

“means for removing unwanted deposits from a bevel of a substrate” (claims 26 and 27) is in proper means-plus-function format and is defined in the specification at page s32-35, paragraphs 83-85 and in Fig. 13.

"means for rinsing and drying the substrate" (claim 26) is in proper means-plus-function format and is defined in the specification at pages 22-24, paragraphs 67-68 and in Fig. 8.

"means for annealing the substrate" (claims 26 and 28) is in proper means-plus-function format and is defined in the specification at pages 15-17, paragraphs 53-57 and in Fig. 4.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 13-17, 19-24 and 26-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Dordi et al US 6,267,853 B1(Dordi).

Dordi teaches an electrochemical deposition system comprising a plurality of plating cells(Fig. 3 numeral 240) disposed on a common platform(Fig. 3 numeral 214), a cleaning cell(Fig. 3 numeral 212) positioned on the platform, an annealing chamber(Fig. 3 numeral 211) in communication with the platform and an electrolyte replenishing system(Fig. 3 numeral 220) in communication with the platform.

Regarding instant claim 13, Dordi further teaches that the electrolyte replenishing system containing source tanks store various solutions(col. 21 lines 10-21) and are in fluid communication with the plating cells(col. 21 lines 31-34). In addition, thorough mixing of various chemicals in the electrolyte is taking place in the electrolyte

Art Unit: 1742

replenishing system(col. 21 lines 43-45). Therefore, Dordi's electrolyte replenishing system meets the limitation of the claimed multi-chemistry fluid delivery system.

Regarding instant claim 14, Dordi teaches at least one plating cell as claimed.

Regarding instant claim 15, Dordi further teaches the claimed electroless plating cells(col. 12 lines 21-29) in addition to the electrochemical plating cells.

Regarding instant claim 16, Dordi further teaches that the electroplating cell comprising a cell bowl(Fig. 6 numeral 430, an overflow weir(Fig. 6 numeral 478), an anode(Fig. 6 numeral 496, Fig. 11 numeral 2004), an ionic membrane(Fig. 6 numeral 494, Fig. 11 numeral 2002) and a diffusion member(Fig. 6 numeral 476) as claimed.

Regarding instant claim 17, the ionic membrane of Dordi is a cationic membrane separating the anode and cathode compartment as claimed.

Regarding instant claim 19, Dordi teaches that the cleaning cell is a spin rinse dry cell(Fig. 3 numeral 212, col. 5 line 24) as claimed.

Regarding instant claim 20, Dordi teaches that the cleaning cell comprises a substrate bevel clean cell(col. 3 lines 55-58, Fig. 14) as claimed.

Regarding instant claim 21, Dordi further teaches that the bevel clean cell comprises a rotatable vacuum chuck(Fig. 14 numeral 2124, col. 9 lines 29-44), a plurality of substrate centering posts(Fig. 14 numeral 2134) positioned radially outward of the vacuum chuck, and a movable fluid dispensing nozzle(Fig. 14 numeral 2150 and 2170) positioned to dispense an etchant solution onto the bevel of a substrate positioned on the vacuum chuck(col. 10 lines 12-14 and 24-27) as claimed.

Regarding instant claim 22, Dordi further teaches that the centering posts of Dordi comprises a raised substrate support portion(Fig. 14, numeral 2140). Since the substrate centering posts of Dordi are located on the peripheral of the workpiece, any one of them read on the claimed eccentrically positioned centering post based on the broadest reasonable interpretation.

Regarding instant claim 23, since the centering posts of Dordi is rotated by the rotation assembly(Fig. 14 numeral 2120), the rotation assembly reads on the actuator as claimed.

Regarding instant claim 24, as stated above, Dordi teaches at least one spin rinse dry cell and at least one bevel clean cell as claimed.

Regarding instant claim 26, Dordi teaches an electrochemical deposition system comprising a central mainframe(Fig. 3 numeral 214) with a substrate transfer robot(col. 3 lines 49-55), a plurality of plating cells(Fig. 3 numeral 240) disposed on a mainframe, a bevel clean cell(Fig. 14) that reads on means for removing unwanted deposits from a bevel of a substrate, a spin rinse dry cell(Fig. 3 numeral 212) that reads on means for removing rinsing and drying the substrate, an annealing chamber(Fig. 3 numeral 211) that reads on means for annealing the substrate and an electrolyte replenishing system(Fig. 3 numeral 220) further comprising an electrolyte circulation between the main tank and the filtration module(col.21 lines 43-45) which reads on the means for mixing multiple plating chemistry and an electrolyte return line(col. 21 lines 32-34) that reads on means for delivering multiple chemical solution to the plating cells.

Regarding instant claim 27, the instant claim is rejection for the same reason as stated in the rejection of instant claim 21 above.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-2, 4-6, 8-11, 25 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi in view of Sendai et al US 6,558,518 B1(Sendai).

The teachings of Dordi are discussed in paragraph 5 above. However, Dordi does not teach the stacked substrate annealing system as claimed.

Sendai discloses an electroplating apparatus comprising vertically stacked heating furnaces(Fig. 26, col. 25 lines 40-61, claim 15).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated a stacked substrate system as taught by Sendai into the annealing system of Dordi in order to allowing annealing of multiple substrates at a time as taught by Sendai(claim 15).

Regarding instant claim 1, Dordi in view of Sendai teaches an electrochemical deposition system comprising a loading station(Dordi, Fig. 3 numeral 210) disposed on a mainframe(Dordi, Fig. 3 numeral 214), a plurality of plating cells(Dordi, Fig. 3 numeral 240) disposed on the mainframe, a bevel clean cell(Dordi, Fig. 14) positioned on the mainframe, a stacked substrate annealing chamber(Dordi, Fig. 3 numeral 211, Sendai,

Art Unit: 1742

Fig. 26) in communication with the mainframe having a substrate heating plate(Dordi, Fig. 8 numeral 904) and a substrate cooling plate(Dordi, Fig. 8 numeral 913).

Regarding instant claim 2, Dordi further teaches at least one spin rinse dry cell(Fig. 3 numeral 212) between the substrate plating cells and the substrate loading station as claimed.

Regarding instant claim 4, the instant claim is rejected for the same reason as stated in the rejection of instant claim 16 above.

Regarding instant claim 5, Dordi further teaches that the diffusion member is a fluid permeable porous ceramic member(col. 18 lines 54-56).

Regarding instant claim 6, the instant claim is rejected for the same reason as stated in the rejection of instant claim 17 above.

Regarding instant claim 8, Dordi further teaches that the annealing chamber comprises substrate support pins(Fig. 8 numeral 906) connected to a lift plate(Fig. 8 numeral 928) to position the substrate in the annealing chamber(col. 25 lines 37-51). Therefore, the substrate support pins and lift plate setup reads on the substrate transfer robot as claimed.

Regarding instant claims 9-10, the instant claims are rejected for the same reason as stated in the rejection of instant claims 21-22 above.

Regarding instant claim 11, Dordi teaches different plating solutions can be connected to different plating cells(col. 21 lines 7-45) which meets the limitation of the instant claim.



Regarding instant claims 25 and 28, Dordi in view of Sendai teach a stacked substrate annealing chamber(Dordi, Fig. 3 numeral 211, Sendai, Fig. 26) having a substrate heating plate(Dordi, Fig. 8 numeral 904), a substrate cooling plate(Dordi, Fig. 8 numeral 913) and a gas distribution nozzle(Dordi, Fig. 8 numeral 936) as claimed.

Regarding instant claim 29, the instant claim is rejected for the same reasons as stated in the rejection of instant claim 1 and 4 above.

Regarding instant claim 30, the instant claim is rejected for the same reason as stated in the rejection of instant claim 24 above.

Regarding instant claim 31, the instant claim is rejected for the same reasons as stated in the rejection of instant claims 8 and 25 above.

Regarding instant claim 32, Dordi teaches an electrolyte return line(Fig. 7 numeral 614) providing electrolyte to the processing cells, the electrolyte return line of the electrolyte replenishing system(i.e. multi-chemistry fluid delivery system) is inherently in fluid communication with the anolyte and the catholyte compartments as claimed.

8. Claims 7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi in view of Sendai, and further in view of Woodruff et al US Patent Application Publication 2001/0032788 A1 (Woodruff).

The teachings of Dordi and Sendai are discussed in paragraphs 5 and 6 above respectively. However, Dordi in view of Sendai do not explicitly teach separate catholyte and anode inlets to the cathode and anode compartment of the process cell.

Woodruff teaches an electrochemical processing chamber comprising separate anolyte and catholyte fluid flows(page 11 paragraph 88).

Regarding instant claim 7, it would have been obvious to one of ordinary skill in the art to have incorporated the separate anolyte and catholyte fluid flows as taught by Woodruff into the apparatus of Dordi in view of Sendai in order to eliminate the consumption of additives at the anode and the need to replenish the additive as often as taught by Woodruff(page 11, paragraph 88).

Regarding instant claim 12, since Dordi in view of Sendai and Woodruff teach the tanks to store various electrolyte solutions and separate catholyte and anolyte fluid flows, Dordi in view of Sendai and Woodruff inherently teaches the fluid communication between the catholyte tank and the cathode chamber of the plating cells and the fluid communication between the anolyte tank and the anode chamber of the plating cells as claimed.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi in view of Woodruff.

The teachings of Dordi are discussed in paragraph 5 above. However, Dordi does not explicitly teach separate catholyte and anode inlets to the cathode and anode compartment of the process cell.

The teachings of Woodruff are discussed in paragraph 8 above.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the separate anolyte and catholyte fluid flows as taught by Woodruff into the apparatus of Dordi for the same reason as stated in paragraph 8 above. The instant

Art Unit: 1742

claim is rejected for the same reason as stated in the rejection of instant claims 7 and 12 above.

### ***Double Patenting***

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-32 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 10/438,624(US Patent Application Publication 2004/0118694 A1) in view of copending Application No. 10/268,284(US Patent Application Publication 2004/0016636 A1), and further in view of copending Application No. 10/823,849(US Patent Application Publication 2004/0209414 A1).

Claims 1-21 of copending Application No. 10/438,624 teaches an electroplating system comprising the claimed loading station, robots, edge bevel cleaning system, spin rinse dry system, annealing system, processing cells and multi-chemistry fluid delivery system. However, copending Application No. 10/438,624 does not teach the claimed stacked annealing system and the details of the processing cells.

Copending Application No. 10/268,284 teaches an electroplating cell comprising a cell bowl, an overflow weir, an anode, a cathode, an ion membrane and a diffuser (claims 1-20). Therefore, it would have been obvious for one of ordinary skill in the art to have incorporated the electroplating cell of copending Application No. 10/268,284 into the apparatus of copending Application No. 10/438,624 in order to maintain the substrate at a constant immersion angle during immersion and plating process as taught by copending Application No. 10/268,284 (See corresponding US Patent Application Publication 2004/0016636 A1, page 1, paragraph 8).

Copending Application No. 10/823,849 teaches an electroplating system comprising a stacked annealing system (claims 1-21). Therefore, it would have been obvious for one of ordinary skill in the art to have incorporated the stacked annealing system of copending Application No. 10/823,849 into the apparatus of copending Application No. 10/438,624 in view of copending Application No. 10/268,284 in order to process multiple substrates at one time to increase throughput as taught by copending Application No. 10/823,849 (See corresponding US Patent Application Publication 2004/0209414 A1, page 1, paragraph 9).

This is a provisional obviousness-type double patenting rejection.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

Art Unit: 1742

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
GEORGE WYSZOMIERSKI  
PRIMARY EXAMINER  
GROUP 1700

LLZ

Sept. 6, 2005